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PUBLIC HEALTH REPORTS.

UNITED STATES.

LEPROSY-LIKE DISEASE IN RATS.

(Report by Passed Asst. Surg. George W. McCoy, San Francisco, Cal.)

Shortly after being assigned to the examination of rats at San Francisco I was informed by the city bacteriologist that he had observed the leprosy-like disease in one or two instances. He also showed me gross and miscroscopic specimens of the lesions.

I therefore began to look for the condition and to keep notes on its occurrence.

During the period covered by this report 13,500 rats were examined and 22 cases of the disease observed. (1:614.) It is believed, however, that the condition is more frequent than these figures indicate, as all of the cases observed have been in full-grown, large rats, and the lesions very well marked. I think it quite probable that I have failed to detect cases in young rats and early cases in general, though a number of lesions that suggested an early stage of "rat leprosy" were submitted to microscopic examination, but always with negative results. All of the cases have been in rats of the species *Mus decumanus*. Where note was made of the sex, the records show that three males and eleven females were observed.

The cases have come from widely separated points in the city, but it is noteworthy that four of them came from Butchertown, three of these being from one establishment. Two others came from places only a few doors apart on Market street.

The essential lesion, or at any rate the one invariably found, has been a more or less general infiltration of the subcutaneous tissues and the peripheral lymph glands with an enormous number of fine white or slightly yellowish granules. At times this infiltration forms a general layer, covering the whole surface of the body between the skin and muscular tissues. At other times it is more or less patchy in distribution. This layer of tissue is usually mistaken for fat. The peripheral lymph glands are invariably enlarged, pale, succulent looking, and upon section are seen to contain a large number of the whitish points corresponding in appearance to the granules found in the subcutaneous tissues. In two of the rats examined the enlargement of individual lymph glands was remarkable. In one case an inguinal gland was 3 c. m. in the long axis by 1½ c. m. in the short axis. In another case the measurements were 1½ c. m. by 1 c. m. The pelvic and mesenteric glands were in one instance decidedly enlarged and showed numerous leprosy-like bacilli in smear preparations.

Alopecia, more or less extensive, was present in 55.5 per cent of the cases; ulceration, in 63.6 per cent. The discharge from the ulcers was usually of a mealy, dryish character, and consisted of enormous numbers of the bacilli and a few remnants of cell débris. In five cases rather large nodules were noted in the subcutaneous tissue, apparently caused by a fusing of a large number of the granules above mentioned.

In one rat only were lesions found in the internal organs. This rat was evidently in a very advanced stage of the disease. In addition to the usual findings granules were found in the retro-peritoneal tissues, on the surface of the peritoneum, on the parietal pericardium, and a few in the liver; in the spleen about a half dozen lesions were found varying in size from a pin head up to about 2 mm. in diameter. These lesions were made up almost entirely of masses of the peculiar bacilli found in this disease. Many bacilli were found in the contents of the bladder; none were found in the intestinal contents. In a number of cases it has been attempted to demonstrate the organism in the nasal mucus; thus far, without success. Beyond these lesions peculiar to the disease, the organs of the animals have appeared to be normal with the exception of the kidneys, which were almost always yellowish or of a slate color, enlarged, friable, and often showed small cysts upon the surface and upon section. This condition of the kidneys is not, however, peculiar to the disease, as it was found in a number of rats otherwise healthy. It is believed that this frequency of nephritis in rats in general here may be due in some measure to the vigorous crusade of poisoning by arsenic and other toxic agents which has been carried on.

The bacilli were acid and alcohol-fast, and were apparantly morphologically indistinguishable from the bacillus of Hansen.

The following is in brief the result of the histological examination of the tissues in a well marked case:

Skin.—All structures of the skin, save only the epithelium and the epithelial glands, were infiltrated with the new tissue formation, which appeared to be made up of cells, the protoplasm of which consisted of a large mass of the acid-fast bacilli, surrounding a well stained nucleus. In no other pathological condition with which we are familiar, excepting perhaps leprosy in man, are such enormous numbers of microorganisms to be found.

Lymph gland.—No evidence of inflammatory reaction was seen in or around the gland. Large, often wedge shaped, masses of the infected tissue were seen running from the capsule toward the hilum of the gland. Between these were seen areas of normal tissue. The bacilli were not homogeneously distributed through the tissue, but appeared as masses, having the general outline of an epithelial cell, but with nothing remaining of the cell but the nucleus. Large areas were seen in which no vestige of the tissue remained beyond the cell nuclei, which lay embedded in a mass of bacilli. Again, scattered groups of the bacilli were seen having the nucleus of a cell lying in their midst, the whole surrounded by an area of otherwise healthy tissue. Occasionally a giant cell was seen with all of the protoplasm replaced by the bacilli. The cell nuclei embedded in these bacterial masses retained well their staining properties. Even the capsule of the gland was invaded. The spindle cells of the connective tissue in the capsule were often densely infiltrated with the organism.

Kidney.—This organ showed a high grade of nephritis of the epithelial type. The cells were largely disintegrated, leaving only nuclei. The glomerular epithelium seemed to be much better preserved than that of the tubules. Numerous small cysts were to be seen. Examination of the liver and spleen showed no abnormality.

The disease corresponds closely with the previously published descriptions and is undoubtedly the same disease that has been described elsewhere.

As to the relation of the disease to leprosy in man, Dr. W. R. Brinckerhoff, Director of the Leprosy Investigation Station at Molokai, T. H., stated in an article which appeared in the Transactions of the Fifteenth Annual Meeting of the Hawaiian Territorial Medical Society as follows:

> The question immediately arises as to whether this disease of the rat may not be human leprosy occurring in that animal. Of course, with the data now available it is impossible to give a categorical answer to this question, but the geographical distribution of the disease speaks against an affirmative reply. It seems more probable that rat leprosy is to human leprosy as is bovine or avian tuberculosis to the human disease, rather than that it is like plague or glanders, a disease common to and transmissible between two species.

A number of rats have been inoculated from typical cases of this interesting disease with the view of making a further study of it, but as a number of months is necessary for the development of the disease in inoculated animals, considerable time will elapse before it will be possible to ascertain whether the inoculations have been successful.

[Reports to the Surgeon-General, Public Health and Marine-Hospital Service.]

Reports from San Francisco, Cal.—Plague-prevention work at San Francisco, Oakland, and Emeryville, Cal.

Passed Assistant Surgeon Blue reports, June 27 and 30:

SAN FRANCISCO, CAL.

Week ended June 27.

Date of last case, sickened January 30, 1908.

Sick inspected	18
Dead inspected	89
Premises inspected	18,370
Necropsy held	1
Houses disinfected	116
Houses destroyed	17
Buildings condemned	11
Nuisances abated	1,744
Rats found dead	416
Rats trapped	4,458
Total rats taken	4,874
Rats identified:	
Mus norvegicus [a]	3,914
Mus rattus	77
Mus musculus	474
Total	4,465
Rats examined bacteriologically	2,990
Poisons placed	158,895

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[a] This species has heretofore been called mus decumanus in this report. The term mus norvegicus is, however, considered preferable.